

PATENT ABSTRACTS OF JAPAN

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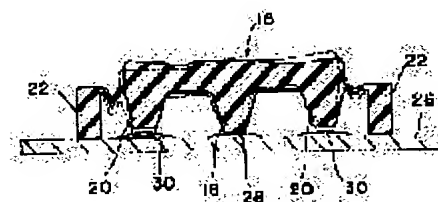
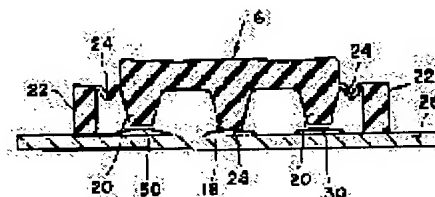
(54) MULTIPLE KEY DEVICE FOR CELLULAR PHONE

(57)Abstract:

PROBLEM TO BE SOLVED: To select and determine an action instruction image with a single key by providing first to fourth directional protruding parts, arranged almost at equal spaces around a determining center protruding part separable from a center diaphragm, separably from first to fourth diaphragms which are formed almost at equal spaces around the center diaphragm on a printed circuit board mounted with a multiple key top.

SOLUTION: A center diaphragm 28 and four peripheral diaphragms 30 circumferentially arranged around the center diaphragm 28 are formed on a printed circuit board 26 which supports a multiple key top 16 through connection parts 24 and support parts 22, and annular and circular fixed contacts are provided under the respective diaphragms.

Normally a determining center protruding part 18, serving as a fulcrum, is in contact with the center diaphragm 28 large in working force, and directional protruding parts 20 are spaced from the peripheral diaphragms 20. A switch is turned on by pressing the upper, lower, left and right directional protruding parts 20, and after an action instruction image on an LCD is scrolled in the upper, lower, left and right directions, the determining center protruding part 18 is pressed. A determining key is therefore omitted.



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 CLAIMS

[Claim(s)]

[Claim 1] Multi-key equipment for personal digital assistants characterized by providing the following. Central diaphragm. The printed wired board which has the 1st arranged by circumferencial direction outline regular intervals around this central diaphragm - the 4th diaphragm. Central heights for determination arranged free [the attachment and detachment to the aforementioned central diaphragm]. The multi-keytop which has the 1st arranged free [the attachment and detachment to the above 1st - the 4th diaphragm] - the heights for the 4th direction by outline regular intervals around these central heights for determination, respectively, and was carried on the aforementioned printed wired board.

[Claim 2] It is multi-key equipment for personal digital assistants according to claim 1 which the aforementioned central heights for determination contact the aforementioned central diaphragm in the state where the aforementioned multi-keytop is not pushed, and is characterized by having estranged the above 1st - the heights for the 4th direction from the above 1st - the 4th diaphragm.

[Claim 3] The aforementioned multi-keytop is multi-key equipment for personal digital assistants according to claim 1 or 2 characterized by having the annular wall with which the nose of cam contacts the aforementioned printed wired board around the aforementioned central heights for determination.

[Claim 4] The aforementioned multi-keytop is multi-key equipment for personal digital assistants according to claim 1 or 2 characterized by having two or more pins by which the nose of cam contacts the aforementioned printed wired board around the aforementioned central heights for determination.

[Claim 5] The aforementioned multi-keytop is multi-key equipment for personal digital assistants according to claim 1 to 4 characterized by having the circular sulcus on the front face, and this dividing the front face of a multi-keytop into the central surface heights which counter the aforementioned central heights for determination, and circumference annular heights.

[Claim 6] The aforementioned multi-keytop is multi-key equipment for personal digital assistants according to claim 5 characterized by having four radial slots further on the front face, and this dividing the front face of a multi-keytop into the 1st which counters the central surface heights which counter the aforementioned central heights for determination, and the above 1st - the heights for the 4th direction - the 4th circumference surface heights.

 [Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to multi-key equipments for personal digital assistants, such as a portable telephone, PHS, and a cordless telephone machine.

[0002] Recently, in addition to the communication between points which the former fixed, mobile communications are developing quickly. Mobile communications are the communication between a mobile (people are included) and ordinary phones, such as a vessel, an automobile, and an aircraft, an office, etc., and communication between mobiles, they become recent years and the spread of portable telephones has a remarkable thing.

[0003] Very many people use these with the spread of a portable telephone, PHS, etc. Furthermore, very much software is incorporated into small telephone with rapid progress and development of these days. Therefore, many functions are called by the easy key stroke, and the key structure which can be used is demanded.

[0004]

[Description of the Prior Art] Much software is incorporated, in order that miniaturization, thin-shape-izing, and lightweight-ization may be advanced and a portable telephone may offer further various functions. Since it is necessary to operate very many keys in order to work the software of such a large number, a key stroke becomes complicated inevitably and the user who cannot fully master the incorporated function can see plentifully in the latest portable telephone.

[0005] In order to make a key stroke easy, various multi-key equipments are developed. For example, in order to scroll the picture displayed on the liquid crystal display (LCD), the 2-way key, the 3 direction key, or the 4 direction key is developed.

[0006]

[Problem(s) to be Solved by the Invention] Conventional multi-key equipment has a main direction key for scrolling the picture displayed on LCD, and the key for determining in many portable telephones needed to be prepared separately.

[0007] Moreover, although the multi-key equipment with which two or more direction keys and determination keys were unified was also developed, since thickness was thick, this multi-key equipment had the fault of not being fit for thin shape-ization of a portable telephone.

[0008] The place which this invention is made in view of such a point, and is made into the purpose is offering the multi-key equipment for personal digital assistants which unified the determination key which determines the direction key and operation which choose the movement directive picture displayed on the display of LCD etc.

[0009]

[Means for Solving the Problem] The printed wired board which has a central diaphragm, and the 1st arranged by circumferencial direction outline regular intervals around this central diaphragm - the 4th diaphragm according to this invention, It has the central heights for determination arranged free [the attachment and detachment to the aforementioned central diaphragm], and the 1st arranged by outline regular intervals around these central heights for determination respectively free [the attachment and detachment to the above 1st - the 4th diaphragm] - the heights for the 4th direction. The multi-key equipment for personal digital assistants characterized by providing the multi-keytop carried on the aforementioned printed wired board is offered.

[0010] Preferably, the central heights for determination contact a central diaphragm, and the 1st - the heights for the 4th direction are estranged and arranged from the 1st - the 4th diaphragm. In order to prevent that a central diaphragm is pushed accidentally, you may make it the nose of cam prepare the annular wall or two or more pins in contact with a printed wired board in the surroundings of the central heights for determination.

[0011] Furthermore, it is desirable by dividing the front face of a keytop into plurality by forming a circular sulcus and/or a radial slot in the front face of a multi-keytop to prevent a malfunction.

[0012]

[Embodiments of the Invention] Reference of drawing 1 shows the plan of the portable telephone which adopted the multi-key equipment of this invention. The receiver section 4 which held the loudspeaker in the interior is formed in the upper-limit section of a portable telephone 2, and the transmission section 6 which held the microphone in the interior is formed in the soffit section.

[0013] The switch section 10 which has a dial function etc., the power supply key 12, the menu screen key 14, and the multi-key 16 are formed in the interstitial segment of a portable telephone 2.

[0014] The cross section with which drawing 2 met the plan of the 1st operation gestalt of this invention, and drawing 3 (A) met 3-3 line of drawing 2 is shown. As shown in drawing 3 (A), the multi-keytop 16 has the central heights 18 for determination, and four heights 20 for directions (for scrolling) arranged by outline regular intervals around the central heights 18 for determination.

[0015] It connects with four supporting section 22 by the connection 24, and the multi-keytop 16 is supported on the printed wired board 26 by such supporting section 22. The connection 24 is thin-shape-ized in order to make deformation of the multi-keytop 16 easy. Mould molding of the multi-keytop 16 is carried out in one from material, such as silicone rubber and an elastomer.

[0016] On the printed wired board 26, the central diaphragm 28 and four circumference diaphragms 30 arranged by circumferencial direction outline regular intervals around the central diaphragm 28 are formed. As for the central diaphragm 28, the rigidity is raised so that an actuation load may be set several times rather than the circumference diaphragm 30.

[0017] As shown in drawing 3 (A), the central heights 18 for determination contact the central diaphragm 28 so that it may become a certain amount of supporting point, and the multi-keytop 16 is carried on a printed wired board 26 so that the heights 20 for directions may be estranged from the circumference diaphragm 30.

[0018] If the front face of the multi-keytop 16 corresponding to the left-hand side heights 20 for directions is pushed as shown in drawing 3 (B), as for the multi-keytop 16, the circumference diaphragm 30 which deforms and corresponds so that it may be shown will be pushed on a dashed line.

[0019] As shown in drawing 4 (A), stationary contacts 32 and 34 are formed in the bottom of the central diaphragm 28 or the circumference diaphragm 30. As shown in drawing 4 (B), annular [of the stationary contact 32] is carried out, and the stationary contact 34 is carrying out the round shape.

[0020] Therefore, if the left-hand side heights 30 for determination are pushed as shown in drawing 3 (B), the corresponding circumference diaphragm 30 will be pushed, a contact 32 and a contact 34 will flow through a diaphragm 30, and a switch will be switched on. Thereby, the movement directive picture on LCD8 scrolls leftward, and a new picture is displayed.

[0021] Reference of drawing 5 shows the display-image view on LCD8. In order to carry out right scrolling, the front face of the multi-keytop 16 corresponding to the right-hand side heights 20 for directions is pushed, and in order to carry out left scrolling, the front face of the multi-keytop 16 corresponding to the left-hand side heights 20 for directions is pushed.

[0022] Moreover, in order to lower-scroll, the front face of the multi-keytop 16 corresponding to the lower heights 20 for directions is pushed, and in order to upper-scroll, the front face of the multi-keytop 16 corresponding to the upper heights 20 for directions is pushed. And the picture chosen by scrolling can be determined by pushing the front face of the multi-keytop 16 corresponding to the central heights 18 for determination.

[0023] Drawing 6 shows the plan of the 2nd operation gestalt of this invention, and drawing 7 (A) shows the cross section which met 7-7 line of drawing 6. Moreover, drawing 7 (B) and drawing 7 (C) show operation of multi-keytop 16A, respectively.

[0024] This operation gestalt forms in the circumference of the central heights 18 for determination in one the annular wall 36 with which the nose of cam contacts a printed wired board 26. Since multi-keytop 16A is formed from material which is easy to deform, such as silicone rubber and an elastomer, as mentioned above By operating the annular wall 36 as the temporary supporting point, as it is shown in drawing 7 (C), in case switching operation is carried out when the annular wall 36 carries out a compression set as shown in drawing 7 (B) in case the central heights 18 for determination are pushed, and the heights 30 for directions are pushed The malfunction that the central heights 18 for determination will push the central diaphragm 28 accidentally can be prevented.

[0025] Drawing 8 is the plan of the 3rd operation form of this invention, and drawing 9 (A) is the cross section which met 9-9 line of drawing 8. Moreover, drawing 9 (B) and drawing 9 (C) show the operation, respectively.

[0026] This operation form is similar to the 2nd operation form mentioned above, and forms four pins 38 by which the nose of cam contacts the circumference of the central heights 18 for determination instead of the annular wall 36 of the 2nd operation form at a printed wired board 26 in circumferencial direction outline regular intervals. It operates like the

2nd operation form which also mentioned this operation form above, and an outline.

[0027] That is, in case it operates because the surrounding pin 38 carries out a compression set as it is shown in drawing 9 (B), in case the central heights 18 for determination are pushed, and the surrounding heights 30 for directions are pushed, the malfunction that the central heights 18 for determination will push the central diaphragm 28 can be prevented by operating a pin 38 as the temporary supporting point, as shown in drawing 9 (C).

[0028] The cross section with which drawing 10 met the plan of the 4th operation gestalt of this invention, and drawing 11 (A) met 11-11 line of drawing 10 is shown. Moreover, drawing 11 (B) and drawing 11 (C) show the operation, respectively.

[0029] the [the 1st mentioned above or] -- in 3 operation gestalten, since it is united near the front face of a multi-keytop, it has little flexibility of movement. Then, with this operation gestalt, a circular sulcus 40 is formed in the front face of multi-keytop 16C, and the central surface heights 42 which counter the central heights 18 for determination, and the circumference annular heights 44 are formed.

[0030] It becomes possible to operate independently the central heights 18 for determination with the heights 20 for directions of the circumference by this, and a malfunction decreases. Drawing 11 (B) is the image view showing operation which is pushing the left-hand side heights 20 for directions, and drawing 11 (C) is the image view showing operation of the central heights 18 for determination.

[0031] The cross section with which drawing 12 met the plan of the 5th operation gestalt of this invention, and drawing 13 (A) met 13-13 line of drawing 12 is shown, respectively. Moreover, drawing 13 (B) and drawing 13 (C) show the operation, respectively.

[0032] This operation gestalt adds the annular wall 36 to the 4th operation gestalt mentioned above. Thus, by forming the annular wall 36 in the bottom of a circular sulcus 40, the malfunction of the central heights 18 for determination can be prevented effectively. Drawing 13 (B) is the image view showing operation of the left-hand side heights 20 for directions, and drawing 13 (C) is the image view showing operation of the central heights 18 for determination.

[0033] The cross section with which drawing 14 met the plan of the 6th operation gestalt of this invention, and drawing 15 (A) met 15-15 line of drawing 14 is shown, respectively. Moreover, drawing 15 (B) and drawing 15 (C) show the operation, respectively.

[0034] This operation gestalt adds four radial slots 46 to the 4th operation gestalt shown in drawing 10. Thereby, the front face of multi-keytop 16E is divided into the central surface heights 42 and four circumference annular heights 48.

[0035] Thus, by forming heights in the front face so that it may correspond to the central heights 18 for determination, and four heights 20 for directions, respectively, each portion becomes easy to operate independently, respectively, and can prevent a malfunction. Drawing 15 (B) is the image view where the left-hand side heights 20 for directions operated, and drawing 15 (C) is an image view at the time of the central heights 18 for determination operating.

[0036] The cross section with which drawing 16 met the plan of the 7th operation gestalt of this invention, and drawing 17 (A) met 17-17 line of drawing 16 is shown, respectively. Moreover, drawing 17 (B) and drawing 17 (C) show the operation, respectively.

[0037] This operation gestalt adds the annular wall 36 to the 6th operation gestalt mentioned above. Thus, while being able to collateralize operating independently, respectively by forming the annular wall 36 in the bottom of a circular sulcus 40, the malfunction of the central heights 18 for determination can be prevented more effectively.

[0038] Drawing 17 (B) is the image view showing operation at the time of the left-hand side heights 20 for directions being pushed, and drawing 17 (C) is an image view at the time of the central heights 18 for determination being pushed.

[0039]
[Effect of the Invention] Since the multi-key equipment of this invention was constituted as explained in full detail above, the movement directive picture displayed on LCD etc. can be chosen, it can decide by one key and the key for determination can be omitted, curtailment of the number of operation keys is possible. Moreover, it can contribute to thin-shape-izing and a cost cut of a portable telephone etc. of a personal digital assistant.

[Translation done.]

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pushed.

[Translation done.]

[Brief Description of the Drawings]

[Drawing 1] It is the plan of the portable telephone which adopted the multi-key equipment of this invention.

[Drawing 2] It is the plan of the 1st operation gestalt of this invention.

[Drawing 3] It is the cross section of the 1st operation gestalt.

[Drawing 4] It is drawing showing a part for a contact surface.

[Drawing 5] It is the display-image view of LCD.

[Drawing 6] It is the plan of the 2nd operation gestalt of this invention.

[Drawing 7] It is the cross section of the 2nd operation gestalt.

[Drawing 8] It is the plan of the 3rd operation gestalt of this invention.

[Drawing 9] It is the cross section of the 3rd operation gestalt.

[Drawing 10] It is the plan of the 4th operation gestalt of this invention.

[Drawing 11] It is the cross section of the 4th operation gestalt.

[Drawing 12] It is the plan of the 5th operation gestalt of this invention.

[Drawing 13] It is the cross section of the 5th operation gestalt.

[Drawing 14] It is the plan of the 6th operation gestalt of this invention.

[Drawing 15] It is the cross section of the 6th operation gestalt.

[Drawing 16] It is the plan of the 7th operation gestalt of this invention.

[Drawing 17] It is the cross section of the 7th operation gestalt.

[Description of Notations]

4 Receiver Section

6 Transmission Section

8 LCD

16, 16A-16F Multi-keytop

18 Central Heights for Determination

20 Heights for Directions

26 Printed Wired Board

28 Central Diaphragm

30 Circumference Diaphragm

36 Annular Wall

38 Pin

40 Circular Sulcus

46 Radial Slot

[Translation done.]

PRIOR ART

[Description of the Prior Art] Much software is incorporated, in order that miniaturization, thin-shape-izing, and lightweight-ization may be advanced and a portable telephone may offer further various functions. Since it is necessary to operate very many keys in order to work the software of such a large number, a key stroke becomes complicated inevitably and the user who cannot fully master the incorporated function can see plentifully in the latest portable telephone.

[0005] In order to make a key stroke easy, various multi-key equipments are developed. For example, in order to scroll the picture displayed on the liquid crystal display (LCD), the 2-way key, the 3 direction key, or the 4 direction key is developed.

Effect of the Invention] Since the multi-key equipment of this invention was constituted as explained in full detail above, the movement directive picture displayed on LCD etc. can be chosen, it can decide by one key and the key for determination can be omitted, curtailment of the number of operation keys is possible. Moreover, it can contribute to thin-shape-izing and a cost cut of a portable telephone etc. of a personal digital assistant.

[Problem(s) to be Solved by the Invention] Conventional multi-key equipment has a main direction key for scrolling the picture displayed on LCD, and the key for determining in many portable telephones needed to be prepared separately.

[0007] Moreover, although the multi-key equipment with which two or more direction keys and determination keys were unified was also developed, since thickness was thick, this multi-key equipment had the fault of not being fit for thin shape-ization of a portable telephone.

[0008] The place which this invention is made in view of such a point, and is made into the purpose is offering the multi-key equipment for personal digital assistants which unified the determination key which determines the direction key and operation which choose the movement directive picture displayed on the display of LCD etc.

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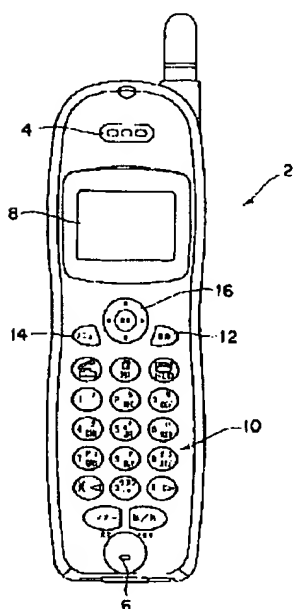
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DRAWINGS

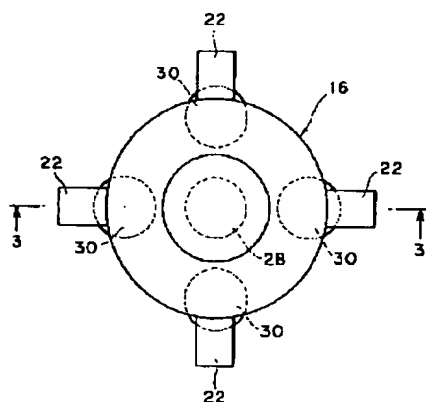
[Drawing 1]

携帯電話機



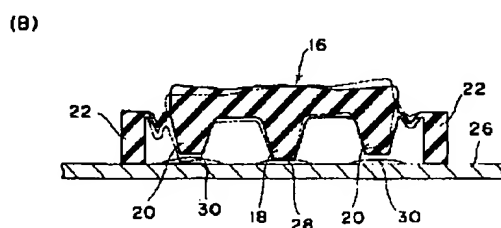
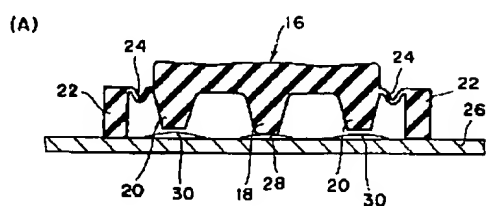
[Drawing 2]

第1実施形態平面図



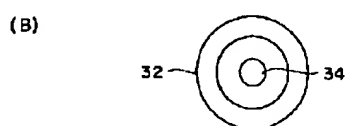
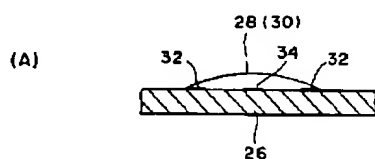
[Drawing 3]

第1実施形態断面図



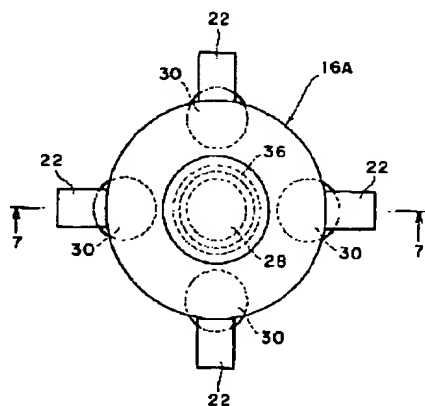
[Drawing 4]

接点部分を示す図



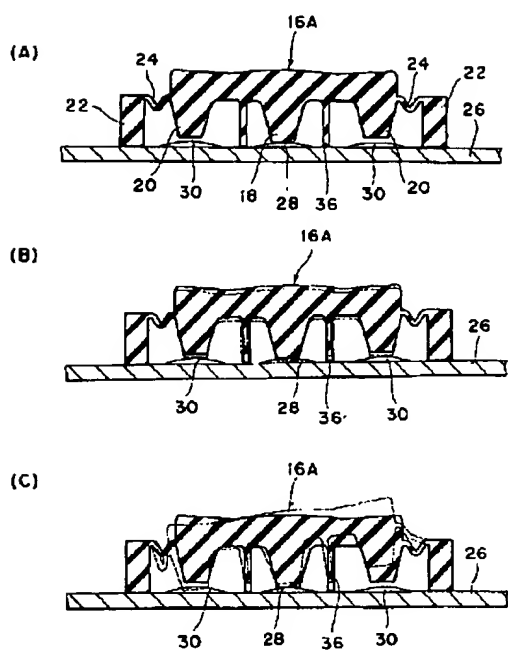
[Drawing 6]

第2実施形態平面図



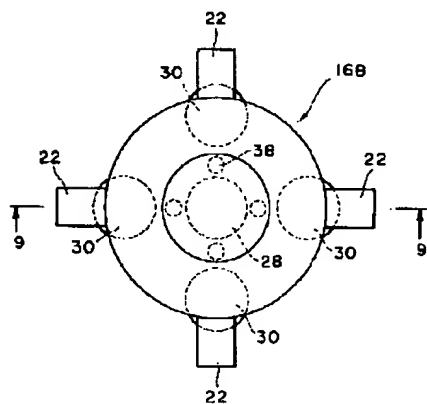
[Drawing 7]

第2 實施形態断面図



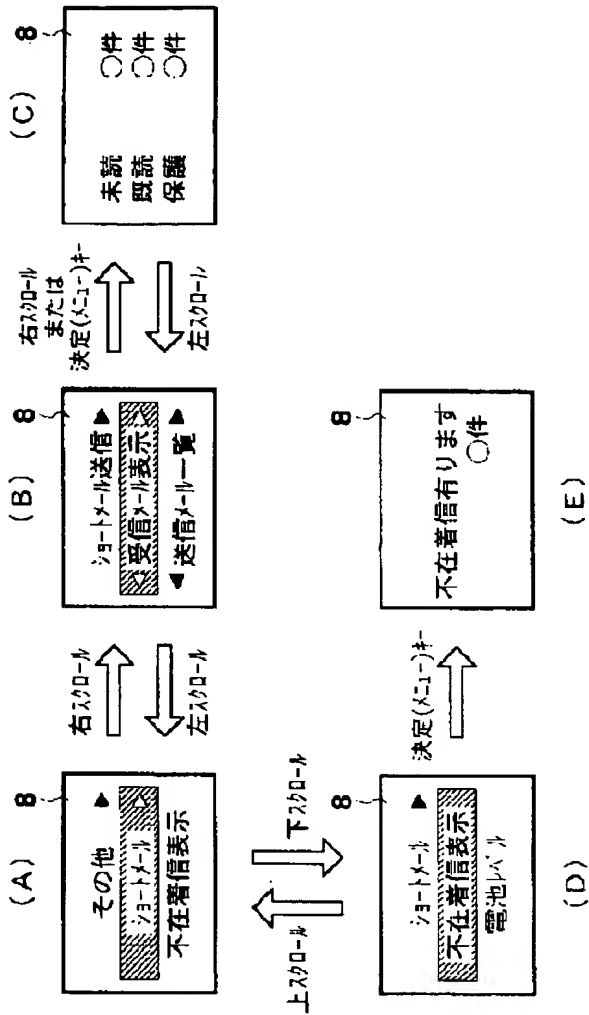
[Drawing 8]

第3 实施形態平面図



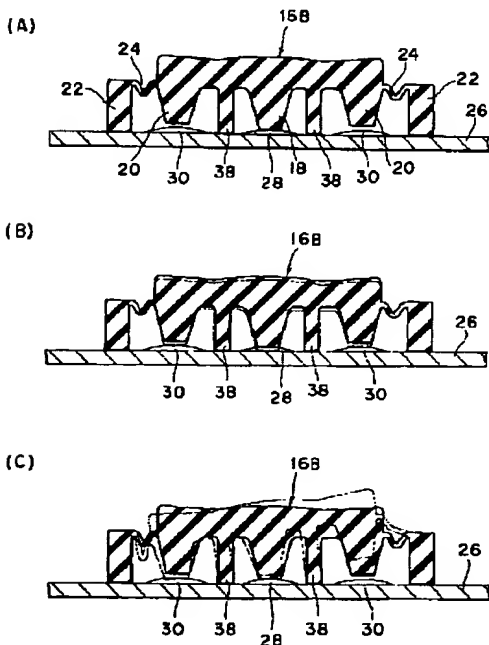
[Drawing 5]

LCD表示イメージ図



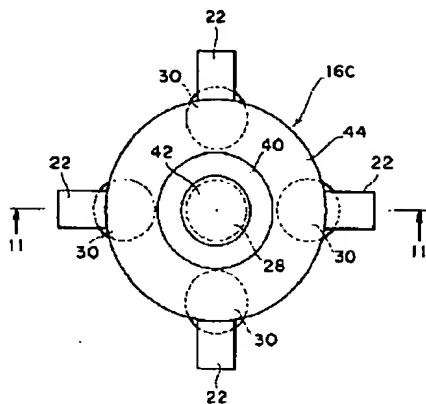
[Drawing 9]

第3実施形態断面図



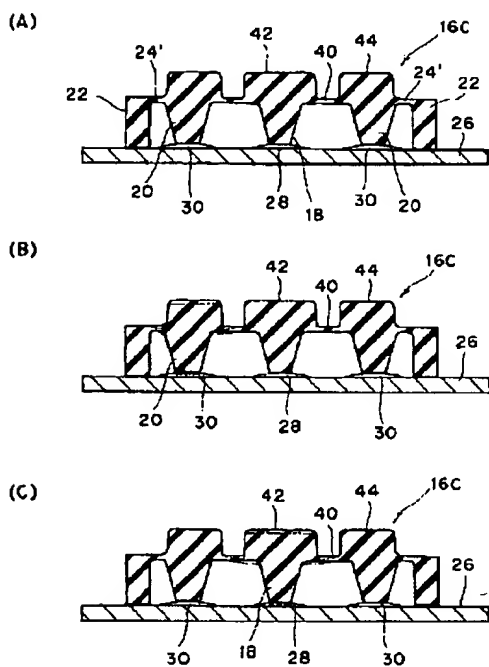
[Drawing 10]

第4実施形態平面図



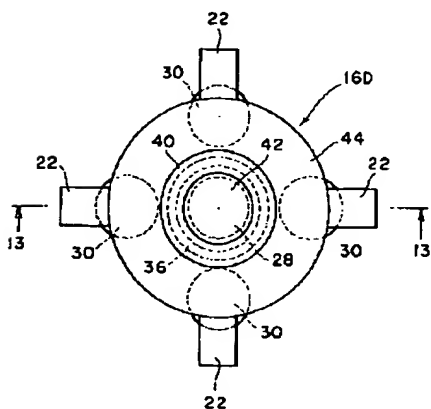
[Drawing 11]

第4実施形態断面図



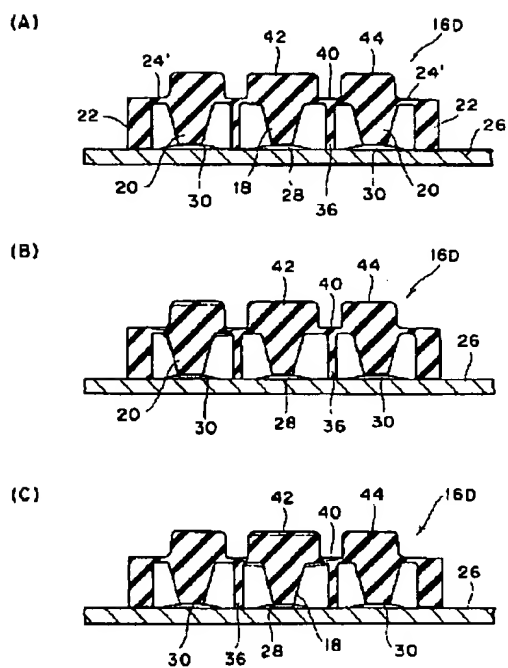
[Drawing 12]

第5実施形態平面図



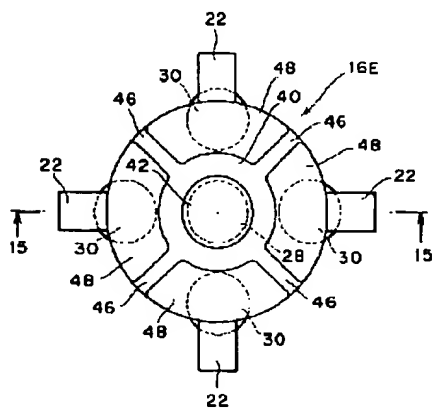
[Drawing 13]

第5實施形態断面圖



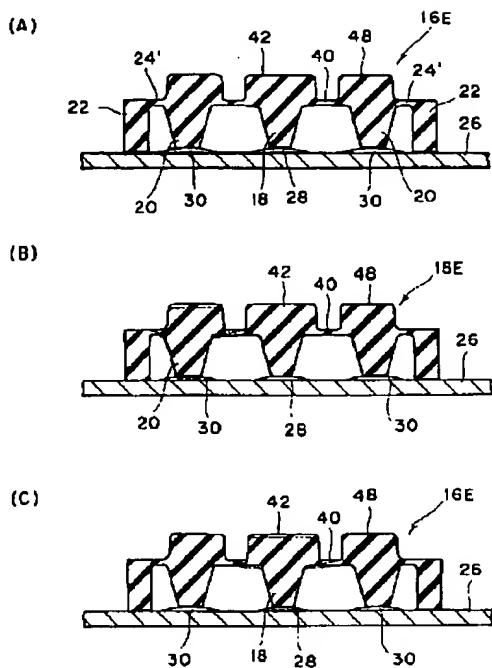
[Drawing 14]

第6實施形態平面圖



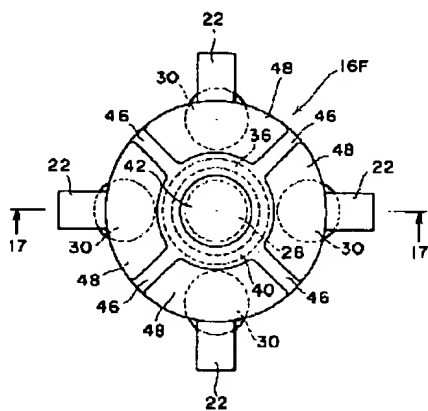
[Drawing 15]

第6実施形態断面図



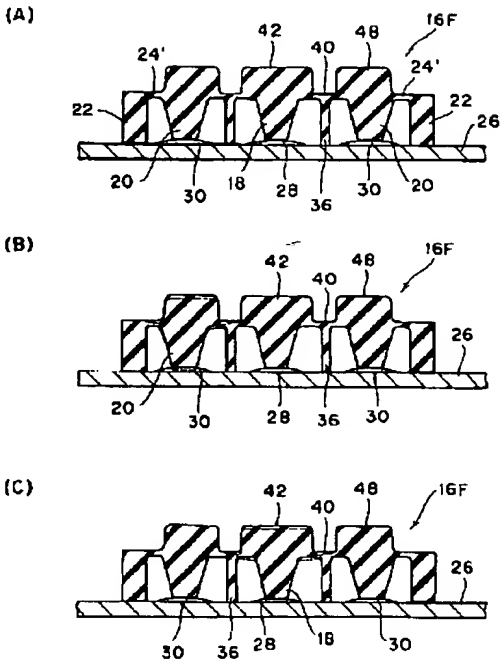
[Drawing 16]

第7実施形態平面図



[Drawing 17]

第7実施形態断面図



[Translation done.]